

Different forms of life - past papers

1. Read the following passage and answer the questions that follow.

The discovery of new mammals is a rare event. The olinguito is the newest member of the family *Prycyonidae*. Indeed the olinguito is distinct from the other species within the genus, known as olingo. A new study published recently has established through DNA and other anatomical evidence that the olinguito *Bassaricyon neblina* is a distinct species. Olingos have reddish brown fur and live in the fast disappearing high forest of Ecuador and Columbia.

a. From the passage write:

i) the scientific name of the olinguito; (1 mark)

ii) the name of the molecule that carries genetic information; (1mark)

iii) ONE characteristic feature of mammals. (1mark)

2. A biology student wrote the classification table for three different organisms (X, Y and Z) as shown in the table below.

	X	Y	Z
Kingdom	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata
Class	Reptilia*	Reptilia*	Mammalia**
Order	Testudines	Squamata	Soricomorpha
Family	Cheluniodea	Lacertidae	Soricidae
Genus	<i>Caretta</i>	<i>Podarcis</i>	<i>Crocidura</i>
species	<i>caretta</i>	<i>filfolensis</i>	<i>sicula</i>

(* Class Reptilia includes reptiles, **Class Mammalia includes mammals)

a. Write ONE structural characteristic common to all the three species in the table above. (1 mark)

b. Write ONE structural characteristic common to organisms X and Y only. (1 mark)

c. Write the letters of the organisms that mainly control their body temperature through their behaviour. (2 marks)

d. Organism Z (*Crocidura sicula*) is an endotherm and has a very small size. Explain the disadvantage caused by its small size in relation to heat loss. (2 marks)

e. Organism Z feeds mainly on earthworms. (1, 1 marks)

i) Name the phylum to which earthworms belong.

ii) Describe ONE distinctive structural feature of earthworms.

f. Earthworms may have internal parasites including Protozoa, Platyhelminthes and Nematodes.

i) Some free-living Protozoa have chlorophyll. Explain the importance of this observation. (2 marks)

ii) Compare the body structure of Platyhelminthes and Nematodes. (2 marks)

(May 2014 Paper I)

3. Read the following passage and then answer the questions that follow.

Wine is produced when yeast, a type of fungus acts on the sugar extracted from grapes. The sugar is converted into alcohol. Different wines are produced by the action of different yeasts on different species of grape vine.

Other types of fungi cause diseases on grape vine. These include downy mildew, powdery mildew and *Botrytis*. Downy mildew is mainly observed on leaves as white brown hyphae growing on the lower surface of the leaf, powdery mildew forms characteristic white floury patches on leaves. *Botrytis* forms an ash grey cover on grapes, causing the fruit to decay and shrivel once infected.

A recent study on the effect of fungal diseases on grape vine showed that the varieties that produce red grapes were significantly less affected by powdery mildew and *Botrytis* than those varieties that produce the white grapes. This may be due to the fact that red grapes have a thicker berry wall than white grapes, preventing the hyphae of the fungus from passing through. Red grapes also contain

a mixture of substances (called phenolics) that slow down the growth of hyphae of these fungal parasites.

Bacteria may also cause disease in grape vines. Phenolics were extracted from different parts of grape vine waste formed during the production of wine, namely stems, skin and seeds. The effect of the extract on four different species of bacteria was then investigated. Results showed bacteria grew slower in the extracts obtained from the red grape vines. The seed extracts were most effective in slowing and preventing growth of bacteria, whilst the stem extracts were the least effective. This might be due to the presence of a large amount of sugars in the stem extracts.

a. Explain why downy mildew, powdery mildew and *Botrytis* are described as 'parasites'. (2 marks)

b. Give ONE structural difference between:

i) a bacterial cell and a fungal cell; (1 mark)

4. The following table lists a number of organisms that are found in different habitats in the Maltese Islands. The table includes the kingdom, the major group and the scientific name of each organism. The common Maltese and English names are include in the last two columns.

Kingdom	Major Group	Scientific name	Common Maltese name	Common English name
Protist	Alga	<i>Ulva laetivirens</i>	Hass il-bahar	Sea lettuce
Plant	Pteridophyte	<i>Adiantum capillus-veneris</i>	Tursin il-bir	Maidenhair fern
Plant	Conifer	<i>Pinus halepensis</i>	Sigra taz-Znuber	Aleppo pine
Plant	Angiosperm	<i>Quercus ilex</i>	Sigra tal-Ballut	Evergreen oak
Plant	Angiosperm	<i>Arum italicum</i>	Garni tal-Pipi	Italian lords and ladies
Animal	Mollusc	<i>Cantareus asperus</i>	Ghakrux ragel	Edible snail
Animal	Arthropod	<i>Periplaneta americana</i>	Wirdiena hamra	American cockroach
Animal	Arthropod	<i>Pholcus phalangioides</i>	Brimba tad-Djar	Daddy longlegs

With reference to the table answer the questions that follow.

a. Give TWO advantages of listing the scientific name of each organism listed in the table (2 marks)

b. The Sea lettuce, *Ulva laetivirens* is a multicellular green alga. Give TWO common **structural** features its cells share with the other plants mentioned in the table. (2 marks)

c. i) Give ONE reason why the *Adiantum capillus-veneris* is found growing only in humid environments, whilst the other plants listed grow in environments that are not as humid. (2 marks)

ii) Explain why all the plants listed in the table can reach larger sizes than bryophytes. (2 marks)

d. *Quercus ilex* is a dicot whilst *Arum italicum* is a monocot.

i) Draw TWO diagrams to show how the external structure of a leaf and the pattern of veins differs in a typical dicot and a typical monocot. (4 marks)

ii) Give ONE similarity and ONE difference one would expect to observe in the seed of a monocot and the seed of a dicot. (3 marks)

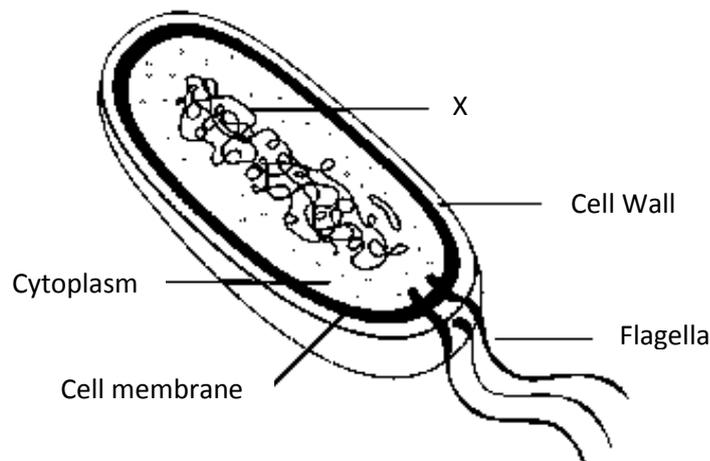
e. i) Give TWO common characteristics of *Periplaneta americana* and *Pholcus phalangooides*. (2 marks)

ii) *Periplaneta Americana* is an insect whilst *Pholcus phalangoides* is a spider. Give TWO structural features that distinguish the two organisms. (2 marks)

iii) List TWO distinguishing structural features that show that *Cantareus asperses* is a mollusc. (2 marks)

(May 2014 paper IIA)

5. The diagram below shows a bacterium.



a. Identify the structure labelled X in the diagram above:

(1 mark)

b. With reference to the diagram explain why bacteria are considered to be prokaryotic. (1 mark)

c. Give ONE function of each of the following structures found in a bacterium: (1, 1, 1 marks)

i) flagellum;

ii) cell wall;

iii) cell membrane.

d. The photograph below shows mushrooms growing in a mushroom farm.



i) Name the kingdom in which mushrooms are classified. (1 mark)

ii) Explain why mushrooms do not need light to grow but plants do.

(2 marks)

c. The structure shown in the photo is typical of a phylum plants.



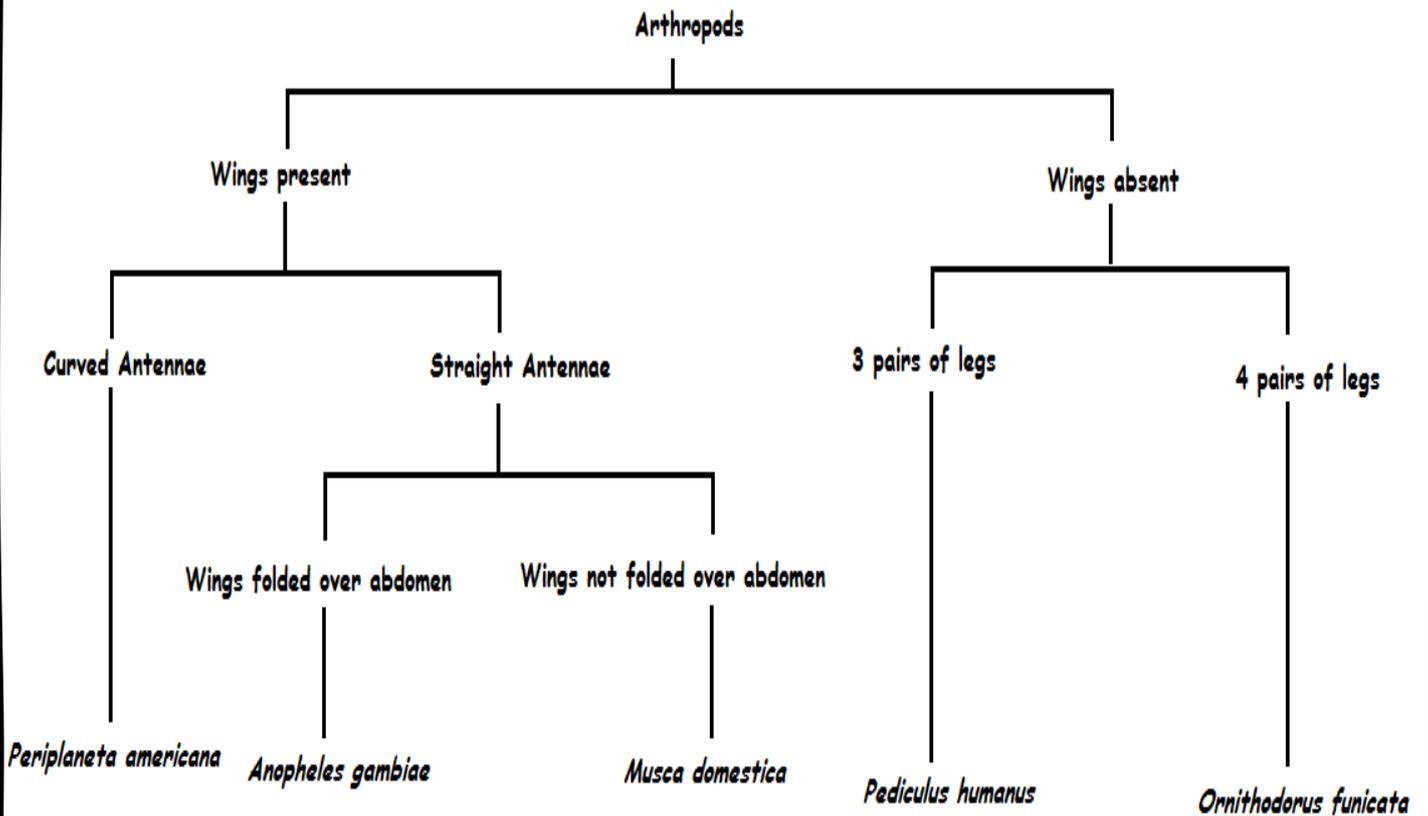
Name the structure shown in the photo and name the phylum of plants that reproduce it.

Structure: _____

Phylum: _____

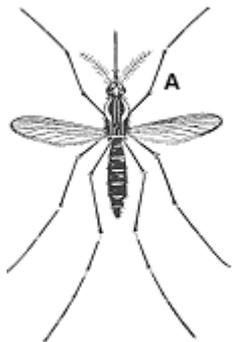
(2marks)

6. a. Use the following identification key to write the scientific names of organisms A to E.

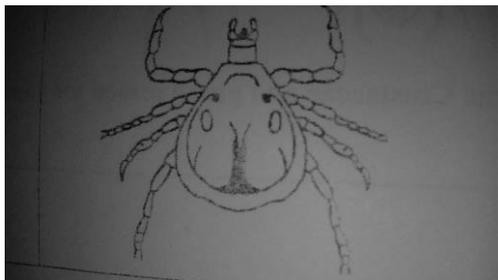


Organism	Diagram	Scientific name
A		

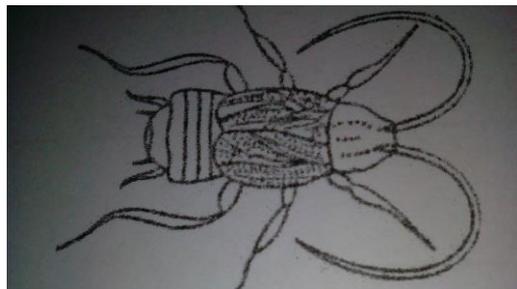
B



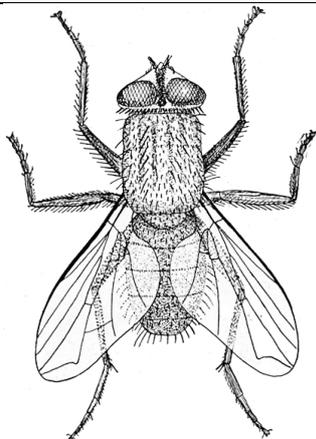
C



D



E

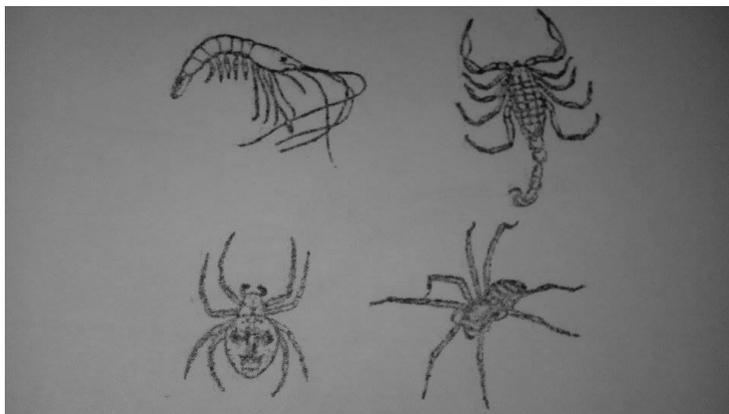


(5 marks)

b. All the organisms shown in this question are Arthropods. Describe ONE common structural characteristic visible in the diagrams that supports this statement.

(1 marks)

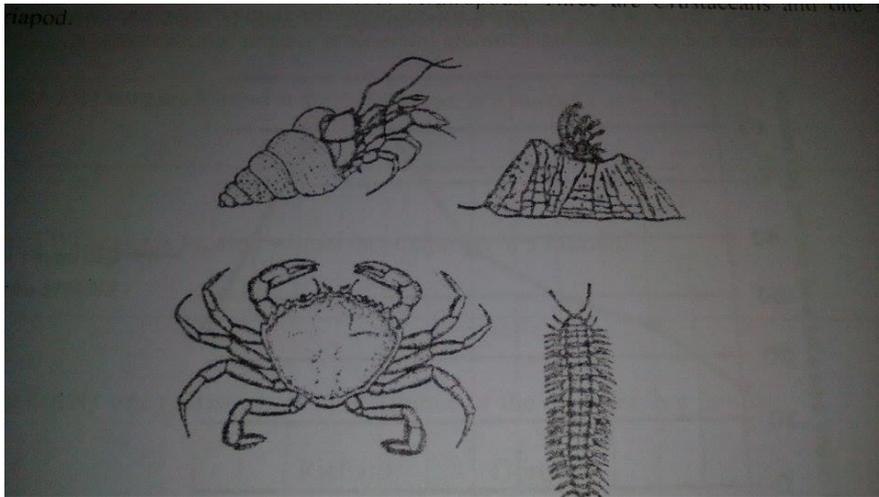
c. The diagram shows four Arthropods. These are Arachnids and one is a Crustacean.



Draw a circle around the Crustacean and give a reason for your answer.

(2 marks)

d. The diagram below shows another set of four Arthropods. Three are Crustaceans and one is a Myriapod.



Draw a circle around the Myriapod and give a reason for your answer.

(2 marks)

(September 2014 Paper 1)

7. At the Malta National Aquarium, students are given the opportunity to observe several aquatic species such as crabs, starfish and sea urchins present in the touch pools.

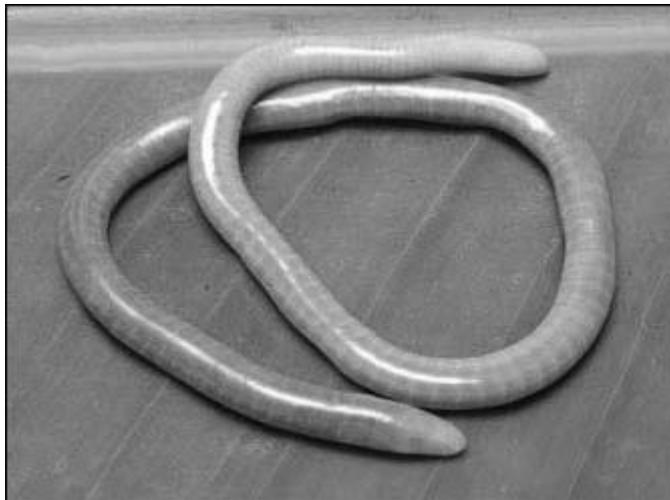
i) Crabs are Arthropods. Name the class to which crabs belong. (1 mark)

ii) The following table lists three species of crabs displayed in one of the touch pools.

Common name	Scientific name
Spider crab	<i>Maja squinado</i>
Warty crab	<i>Eriphia verrucosa</i>
Marbled rock crab	<i>Pachygraspus marmoratus</i>

Explain why these crabs are not closely related. (1 mark)

8. The photo below shows a **caecilian** (pronounced 'siss-ee-lee-an'). It is an amphibian which is often mistaken for an earthworm or a snake. Caecilians feed mostly on invertebrates such as worms or termites. Many species burrow in soil or hide under leaf litter, often coming out only at night. Other species live in fully or semi-aquatic habitats. Most caecilians are found in moist tropical regions.



a. Name the phylum to which amphibians belong.

b. i) List **ONE** internal structural characteristic present in a caecilian but absent in an earthworm. (1 mark)

ii) List **ONE** difference the skin surface of the caecilian and the skin surface of a snake. (2 marks)

c. Explain why most caecilians are found in 'moist' habitats. (2 marks)

d. Some caecilian species give birth to live young. The fertilized eggs are kept inside the mother's body before hatching. This increases the chances of survival of the young caecilians.

i) Name another group of animals that characteristically give birth to live young. (1 mark)

ii) Give **ONE** reason why keeping fertilized eggs inside the mother's body increases the chances of survival of young caecilians. (2 marks)

(May 2013 paper 1)

9. Read the following passage and then answer the questions that follow.

Sloths are tree-dwelling mammals that spend most of their life hanging upside down - they usually eat, sleep and even give birth in this position. They move very little... and very slowly. They have short, flat heads with big eyes, a short snout and tiny ears. Sloths are related to anteaters and armadillos. There are two different families of sloth - two fingered and three fingered. These two families found today are only distant relatives and began to evolve independently of each other 65 million years ago, while adopting remarkably similar lifestyles in the tree canopies of South and Central America. Currently there are just six species of sloth - all of

which are found in regions where the tropical climate maintains relatively warm temperatures all year round.

The two fingered sloths have mostly blonde or light brown hair and are nocturnal (active during the night). In contrast, three fingered sloths have evolved large, slow-acting four-chambered stomachs that contain bacteria. These bacteria produce enzymes that help to break down the tough leaves.

The key to the sloth's slow pace is their low-energy diet. The diet supplies little energy because it is hard to digest and so low in calories. To survive on their low calorie diet, sloths have evolved a low metabolic rate and have approximately 20% less muscle mass than other mammals - so fast movement is virtually impossible for them. Therefore to avoid predation and conserve energy, they have adopted a 'slow and careful' strategy. They also conserve energy by reducing their ability to thermoregulate and can withstand unusually low and variable body temperatures. Most mammals maintain a relatively stable body temperature of approximately 36°C. The body temperature of a sloth, however, regularly fluctuates by over 4°C throughout the course of a single day. Sloths are unable to sweat, pant or shiver. They rely on behavioural methods in order to keep warm or cool.

- a) Sloths are classified as mammals. Give TWO distinctive features expected to be observed in sloths to support this classification. (2 marks)

- b) i) Define the term *species*. (2 marks)

ii) Give TWO distinguishing features that allowed scientists to classify different species of sloths in the two different families. (2 marks)

10. Photographs **A** and **B** show a selection of arthropods found in the Maltese islands. For **each** arthropod the following names are given: the scientific name, the common English name and the common Maltese name.

A



Scientific name: *Creophilus maxillosus*

Common English name: Rove beetle

Common Maltese name: Kappillan

B Scientific name: *Argiope lobate*

Common English name: Lobed Argiope

Common Maltese name: Brimba Kbira tal-widien



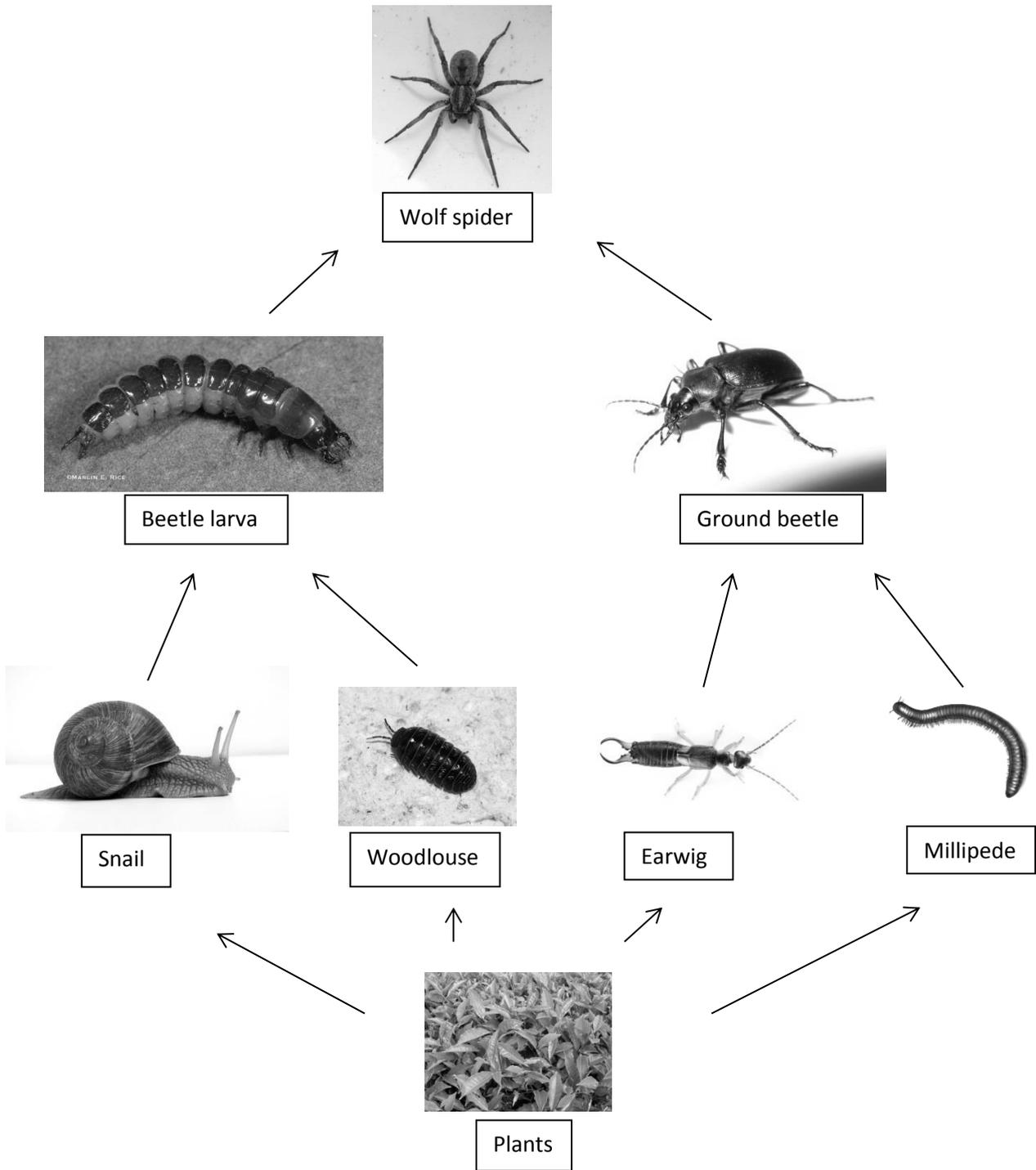
i) List TWO advantages of using the binomial system to name and classify each organism. (4 marks)

ii) Give TWO visible features in the photos that confirm that the two organisms shown are arthropods. (2 marks)

iii) Name the arthropod class of **each** organism shown. In **each** case give **ONE** reason for your choice. (4 marks)

(May 2013 paper IIA)

11. The following diagram shows a woodland food web.



a) From the diagram name: (5 marks)

i) ONE arachnid: _____

ii) ONE mollusc: _____

iii) ONE myriapod: _____

iv) ONE crustacean: _____

v) ONE arthropod: _____

b) Buskett Gardens is one of the few woodland areas in Malta. Woodland areas in the island are characterized by the Holm Oak and Aleppo Pine trees. The Holm Oak is an angiosperm while the Aleppo Pine is a gymnosperm.

i) State ONE way a biology student can identify a gymnosperm. (1 mark)

ii) List ONE way how a biology student can identify an angiosperm. (1 mark)

c. Oak wilt is a disease caused by the fungus *Ceraticystis fagocearum*.

i) Explain why fungi are not green. (1 mark)

ii) A biology student remarked that most fungi are made up of tangled mass of threads. Write the term that describes the thread-like structures in fungi. (1 mark)

d. Pine wilt is a disease of the Aleppo Pine trees caused by the pinewood nematode. Give TWO characteristics of nematodes. (2 marks)

e. In a woodland area one might come across vascular plants that lack flowers and seeds. Such plants are easy to recognize by their frond-like leaves. These plants reproduce by spores.

i) Name the group to which these plants belong. (1 mark)

ii) Name the structure inside which the spores of these particular plants develop. (1 mark)

(September 2013 Paper I)

12. Although the mauve stinger jellyfish (*Pelagia noctiluca*) does not seem to be in abundance this summer, other species are increasing, Alan Deidun, the biologist coordinating the "Spot the Jellyfish" campaign remarked. One notable example was the box jellyfish - *Carybdea marsupialis* - which has been sighted by numerous bathers. Although being largely transparent, the species is still relatively easy to spot and to identify since, unlike other species of jellyfish, it does not have a spherical umbrella but a squarish one, with four tentacles dangling down from its umbrella. The venom in box jellyfish is distinct from that in other conventional jellyfish and is used by the jellyfish to protect itself against predators such as the rabbit fish, and turtles, besides being used for capturing prey.

a. From the passage above write the term that best fits **each** of the following descriptions: (3 marks)

i) reptiles characterized by a special bony or cartilaginous shell:

ii) the type of organism that is attacked and eaten by another organism:

iii) elongated and flexible organs with stinging cells present in jellyfish:

b. Name the phylum to which jellyfish belong. (1 mark)

c. A biology student wrote that the mauve stinger jellyfish and the box jellyfish belong to the same species. Use the information in the passage to give ONE reason why this statement is incorrect. (2 marks)

(May 2012 paper I)

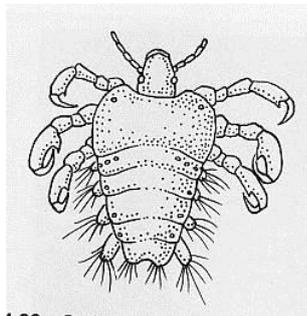
13. Bacteria and prokaryotes. Some are heterotrophs while others are autotrophs.

a. List TWO structural characteristics of prokaryotes. (2 marks)

14. Comment on the biological significance of the following statement.

a. Classification systems are used to give organisms scientific names. (4 marks)

15. The following diagram shows the parasitic crab louse *Phthirus pubis*. It takes its name from its resemblance to a small crab. The organism causes a sexually transmitted disease commonly called Crabs.



i) Name the phylum to which this parasitic 'crab' belongs. (1 mark)

ii) From the diagram list TWO structural features of the crab louse. (2 marks)

iii) The crab louse develops from an egg to an adult by means of incomplete metamorphosis. Explain the term *incomplete metamorphosis*. (2 marks)

(May 2012 paper IIA)

16. Read the following passage and answer the questions that follow.

The world's smallest fog discovered

A frog species that appears to be the world's smallest has been discovered in Papua New Guinea. At 7mm long, *Paedophryae amanuensis* may be the world's smallest vertebrate. The team of researchers also found a slightly larger relative, *Paedophryae swiftorum*. The researchers suggest that the frogs' tiny size is linked to their habitat, in leaf litter on the forest floor. The researchers remarked that finding the frogs was not an easy task. The frogs were well camouflaged among leaves on the forest floors and they have evolved cells resembling those of insects, thus making them hard to spot. These small frogs are probably prey for a large number of relatively small invertebrates that don't usually prey on frogs. Predators may well include scorpions.

a. From the passage above write the term that best describes **each** of the following statements: (5 marks)

i) dead plant material on the soil surface: _____

ii) organisms that do not have a backbone: _____

iii) arthropods characterized by the presence of three pairs of legs and one pair of antennae: _____

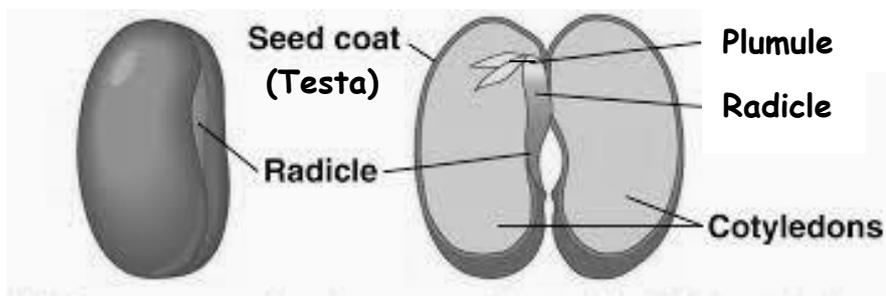
iv) organisms that are structurally similar and can produce fertile offspring. _____

v) the exact place where an organism lives: _____

b. i) Name the kingdom in which frogs are classified. (1 mark)

ii) Name the class of vertebrates to which frogs belong. (1 mark)

17. The diagram shows a dissected dicot seed.



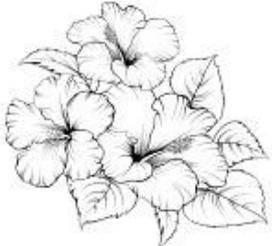
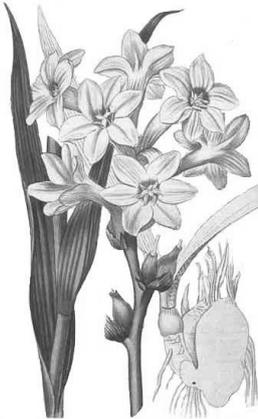
a. Use the labels in the diagram to name the structure that best matches **each** description in the table below: (4 marks)

Description	Structure
Protects the plant embryo and cotyledons	
Develops into a root upon germination	
Develops into a shoot upon germination	
Provides a store of starch	

b. Give ONE difference between the seed in the diagram above and a monocot seed. (1 mark)

c. Name ONE group of plants which do not produce seeds. (1 mark)

d. i) The table below shows 2 types of flowers. Identify which flower is a monocot and which is a dicot. In the space provided under each picture write M for monocot and D for dicot. (2 marks)

Swamp mallow	Lemon fawn lily
	

ii) List **two** visible features used to identify each type of plant shown in the table above as a monocot or dicot. (2 marks)

Feature 1:

Feature 2:

(September 2012 paper I)

18. The picture below shows an elephant shrew:



A biology student wrote that elephant shrews eat mainly insects such as spiders and centipedes. Explain why this statement is incorrect. (2 marks)

a. The biology student listed the following five elephant shrews:

Elephantus fuscus;

Petrodomus tetradactylus;

Mascroscelides proboscideus

Elephantus rozeti

Rhyncchocycon cimei

i. How many genera of elephant-shrew mammals are included in the list? (1 mark)

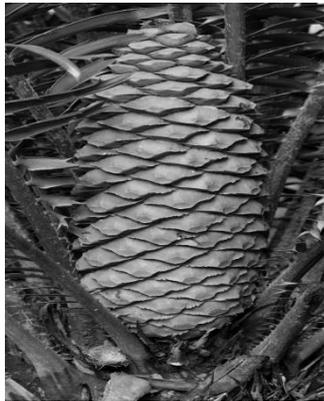
ii) Which TWO elephant shrew species from the list are most closely related? (2 marks)

19. A biology teacher organised a site visit to the Argotti Botanical Gardens at Floriana. During the visit students observed a variety of monocots.

a. List ONE visible leaf feature that enables a biology student to easily identify a monocot. (1 mark)

b. A biology student took pictures of two different plants. Name the phylum of the plants shown in each of these pictures.

A



B



A: _____

B: _____

c. During the visit, the guide stated that bryophytes include two small and often neglected groups of plants.

i. Name ONE of these groups.

ii. Bryophytes are non-vascular plants. Explain.

iii. Bryophytes lack flowers and do not produce seeds. How do bryophytes reproduce? (1, 2, 1 mark)

(May 2011 paper I)

20. Give a biological explanation for **each** of the following statements:

a. Each species has a binomial name. (3 marks)

b. Fungi do not have chlorophyll. (3 marks)

(May 2011 paper IIA)